Chapter 13. Mountain Counties Area of California

Setting

The Mountain Counties Area of California includes the foothills and mountains of the western slope of the Sierra Nevada and a portion of the Cascade Range. The area extends from the southern tip of Lassen County to the northern part of Fresno County (see Figure 12-1) and covers the eastern portions of the Sacramento River, San Joaquin River, and Tulare Lake hydrologic regions. The foothill and mountain areas of these three hydrologic regions are grouped together for the purpose of presenting their common characteristics.

The area generally includes all or portions of Shasta, Lassen, Plumas, Butte, Sierra, Yuba, Nevada, Placer, El Dorado, Amador, Alpine Calaveras, Tuolumne, Mariposa, Madera, and Fresno, counties. Elevations vary from around 100 feet near the edge of the valley floor to more than 10,000 feet at locations along the Sierra Nevada and Cascade Range crestline. The major rivers in the area include the Sacramento, Pit, Feather, Yuba, Bear, and American Rivers in the Sacramento River Region; the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, and San Joaquin Rivers in the San Joaquin River Region; and the Kings, Kaweah, Tule, and Kern Rivers in the Tulare Lake Region.

Climate

The climate is closely tied to the topography and varies widely throughout the area; mean annual precipitation ranges from more than 80 inches at Strawberry Valley, east of Lake Oroville, to less than 12 inches at Fresno County. Much of the precipitation falls as snow in the higher elevations in the winter. Water managers throughout the area rely on this natural storage as snow in the winter months and capture and/or divert spring snowmelt runoff.

Population

The 2000 population of the area was about 542,000, less than 2 percent of the state total population. However, the effects of urbanization are beginning to impact some of the foothill areas. Population growth in the area from 1990 to 1995 was almost 10 percent. The State's growth rate during the same 5-year period was about 7 percent. Although total population in the area is low, the area's rate of growth is projected to continue to outspace that of the state as a whole. The projected population increase between 1995 and 2020 is about 85 percent for this foothill and mountain area, while the state's growth is projected at less than 50 percent.

Per capita water use varies significantly throughout the area, from about 115 gallons per capita per day (gpcd) in the Volcano are of Amador County to about 420 gpcd in the southwestern corner of Lassen County.

Land Use

The economies of these mountain and foothill areas have historically been tied to the land. Tourism, ranching, timber harvesting, limited mining, and agriculture, primarily in the lower elevations, continue as an economic base for many communities. A limiting factor for the area's population growth is the relatively small amount of land in private ownership. The federal government is the dominant landowner

in the area, with most of the higher elevation lands being under the management of the U.S. Forest Service or National Park Service.

Much of the state's developed water supply originates in this upland area, including several CVP and SWP reservoirs. Although the region has abundant water supplies, the vast majority is unavailable locally due to prior appropriations for downstream or out-of-basin users. Local use of water originating in the region is less than 3 percent of the total statewide consumption.

Water Supply

The primary source of public consumptive water supply is locally developed surface water (almost 70 percent). Water is either diverted directly from the area's streams and lakes or from local storage reservoirs and conveyance facilities. Many of the residents in the unincorporated areas are dependent on small, independent municipal water systems, or on untreated water diverted directly from one of the numerous raw water ditch delivery systems that run throughout the region. In addition, many individual water users throughout the area have developed their own supplies, typically groundwater for domestic use and surface or in limited cases, groundwater for agricultural use.

Regulation of Ditch Water – Water users in the foothills who obtain their water from ditches are no longer able to use that water for domestic purposes. New rules promulgated by the California Department of Health Services and the U.S. Environmental Protection Agency prohibit residential customers from cooking, drinking or brushing teeth with ditch water, including water processed by home treatment systems. In order to meet these requirements, several water districts are requiring customers to receive 5 gallons of bottled drinking water per month. This quantity meets the state's minimum estimate of what a normal household would use in a month.

Mining operations (especially hydraulic mining) of the gold rush era started much of the water supply development to the foothill and mountain areas. Many of those early mining water systems were later taken over by other water users. Pacific Gas & Electric Company and other hydropower utilities subsequently developed an extensive hydroelectric power and consumptive water use delivery system throughout the Sierra Nevada, often incorporating some of the old mining ditches. Most of these conveyance facilities devoted to consumptive water delivery were later transferred to local public entities. Many of these local water agencies still use the ditch systems as a primary means of water delivery to both their water treatment plants and to the individual water users located along the route to the treatment facilities. Many of these old and unimproved conveyance systems, including ditches, flumes, and pipes have been in use for more than 100 years.

While logging and mining operations have decreased, recreation and tourism have increased with consequent effects on water use and quality. Many of the foothill and mountain areas possess significant numbers of second homes and vacation rentals. This means that, although there is no permanent population associated with these homes, water use can be high on most weekends during the popular summer and winter vacation periods. For example, Groveland Community Services District, near Yosemite National Park in southern Tuolumne County, estimates that the service area population more than doubles during peak vacation periods. Tourism use, which is most significant in the central Sierra, tends to inflate the area's per capita water use.

The majority of the area's irrigated acres are found in the foothills and mountains of the Sacramento River Region. The dominant crop is pasture, with about 70 percent of the irrigated acreage. Other crops with significant acreage include alfalfa, grain, wine grapes, apples and other deciduous fruit, and olives. Projections indicate almost no change in irrigated acreage through 2020, with a slight change in crop mix. Significant unirrigated areas are used for rangeland for livestock.

Environmental water use in the area is limited to instream flow requirements and one managed wetlands. Instream flow requirements within the area are found on the Stanislaus River, below Goodwin Dam, and the Tuolumne River, below La Grange Dam. The controlling instream requirements for the remainder of the area's many streams are located on the valley floors. In addition, many of the smaller reservoirs in the area do have instream, flow requirements, which are met by the project operators. However, only the largest instream requirement for a given stream is accounted as a demand and those requirements are more often found downstream of this foothill and mountainous area. Most environmental water flows originating from within the area result from meeting required environmental flows outside the area on the valley floors to the west. The Ash Creek Wildlife Area, a managed wetland, is located in the region.. The managed portion of the area includes 600 acres of permanent emergent wetlands, 700 acres of seasonally flooded lands, 1,000 acres of irrigated forage crop, and 3,600 acres of wet meadow. Water supplies include diversions from Ash Creek, Roberts Reservoir, and groundwater. The annual water use by the wildlife area is 13,000 acre-feet.

Groundwater constitutes about 16 percent of area-wide water supply and is generally a supply for single family homes. Groundwater availability is generally limited to fractured rock and small alluvial deposits immediately adjacent to the area's many streams. Many individuals in the area are wholly dependent upon groundwater for domestic use. A limited number of farmers have developed wells with enough production to irrigate their lands in all but the driest of years. In addition, many homes are not connected to a municipal water system and are typically dependent upon domestic wells or raw untreated water delivered through an open ditch system. In general, groundwater is inadequate and unreliable due to the limitations of the fractured granite to perform as a groundwater basin.

Other sources of supply, present in the area to a limited degree include Central Valley Project with other federal project water, locally developed imports, and reclaimed wastewater. El Dorado Irrigation District and Foresthill Public Utility District possess water supply contracts for CVP supply. Calaveras County Water District and Union Public Utility District receive water from New Hogan Reservoir, which is operated by the US Army Corps of Engineers. Irrigated pasture in Sierra County receives water imported from the Little Truckee River in the North Lahontan Region. In addition, PG&E exports water from Echo Lake near Lake Tahoe in the North Lahontan Region as part of a hydropower diversion to the American River basin. Reclaimed wastewater is used to a limited extent to irrigate golf courses and meet other landscaping and agricultural needs.

The following water balance table summarizes the detailed regional water accounting contained in the water portfolio at the end of this regional description. As shown in the table, most of the area's water flows to other hydrologic regions.

State of the Region

Challenges

By virtue of their location, domestic water users in the Mountain Counties generally benefit from higher quality water than most other Californians. Many water supplies are from pristine foothill or mountain sources, which are largely unaffected by agricultural or urban pollution. Unfortunately, all too often, this higher quality water is often degraded while in transit through the numerous open ditch delivery systems. Drainage from abandoned mines contributes metals and other water quality problems to downstream water bodies. Mercury was often brought into the region as part of the gold mining process. Erosion from natural flooding, logging and land development, and areas devastated from forest fires, causes sedimentation, and elevated temperatures due to the loss of riparian shade canopy. This is a concern to both domestic water treatment operations and migration and spawning of salmonids in areas not already blocked by water impoundments.

The biggest water issue facing users in the area is the need to improve the water supply reliability of the various systems throughout the area. Despite rapid population growth, the customer base of water systems is still relatively small. This smaller base, coupled with previous development of the less costly reservoir sites, as well as the topography, makes system improvements expensive and makes interconnections between systems impractical. Also, a limited array of options is available to meet current and projected needs due to the local water users' limited ability to pay and the impossibility of employing groundwater banking and conjunctive use strategies. Many local officials directly responsible for water delivery within the Mountain Counties Area anticipate a reliance on state "Area of Origin and Watershed Protection" law for both meeting projected growth within their respective areas as well as improving water supply reliability to existing users. These statutes provide for the reservation of water supplies for counties in which the water originates when a state water right filing is assigned for use elsewhere, as well as setting aside water for future development in the area (see Chapter 2 for more information). Typically, however, the upland areas have not had the population and capital base to contract with SWP or CVP, nor has the SWP or CVP had adequate supplies of unallocated water to meet the needs of upstream communities. A complicating factor is, in cases where Project water may be available, the potential service areas in the foothills are both higher in elevation and geographically distant from Project facilities, thus curtailing construction of expensive distribution systems.

Many small water systems in the foothills and mountains of California have historically tapped surface water or springs that required minimal treatment in order to meet both state and federal standards; other small systems rely upon delivery from open ditches. These systems, must maintain reliable filtration and disinfection facilities. When such treatment upgrades are infeasible, EPA and state health regulations are instead requiring customers to receive bottled drinking water. Common to the ditch delivery systems within the Mountain Counties region is the tendency to have large conveyance losses. Repairs on some systems have been opposed by various groups and landowners who argue the loss of the aesthetics of the flowing canal, loss of vegetation and wildlife created by leakage and percolation and who see the water saved as growth inducing.

After the 1997 floods, a landslide destroyed a 30-foot section of Georgetown's canal, which supplies water to 9,000 customers in six towns in rural El Dorado County. Nearby, El Dorado Irrigation District also lost use of it flume from the forebay on the American River due to a separate landslide.

The Mountain Counties areas are concerned with forest fires and the damage they cause to the watersheds and the wooden infrastructure associated with the ditch systems. Every year, numerous forest fires occur in the Sierra Nevada and expose the watershed to erosion and change runoff timing. Sediment can, obstruct water flow in open ditches, reduce reservoir capacity, add nutrient loading, diminish water quality and cause excessive algae growth. Fires have damaged components to the ditch systems including diversion structures and flume sections. As a result communities have been left without water for extended periods of time.

Water supply managers in the area are concerned about Federal and State designation of Wild and Scenic streams. Wild and Scenic status precludes water resources development. Environmental interests are concerned about preserving the few undeveloped streams or sections of streams remaining in the area. Federal statutes prohibit federal agencies from constructing, authorizing, or funding water resources projects having a direct and adverse effect on the values for which the river was designated. The state wild and scenic law prohibits construction of any dam, reservoir, diversion, or other water impoundment in specific regions. Diversions needed to supply domestic water to residents of counties through which the river flows may, in some cases, be authorized.

Like surface water, groundwater in this region is generally of good quality, but it may be contaminated by naturally occurring radon, uranium, and sulfide mineral deposits containing heavy metals. In particular, radon contamination is associated with granite, such as the granite batholith of the Sierra Nevada. Meeting state secondary standards for both iron and magnesium can also be difficult. Also, because of the lack of community wastewater systems, individual septic tanks are prevalent in this region, potentially adversely affecting groundwater quality.

In 1996, the University of California released its "Sierra Nevada Ecosystem Study," as apart of a project by the same name. The report is the result of a three year congressionally mandated study of the entire Sierra Nevada, with a primary emphasis on gathering and analyzing data to assist Congress and other decision makers in future management of the mountain range. The project goal is to maintain the health and sustainability of the ecosystem while providing resources to meet human needs. The study states that, "excluding the hard-to-quantify public good value of flood control and reservoir-based recreation, the hydroelectric generating, irrigation and urban use values of water are far greater than the combined value of all other commodities produced in the Sierra Nevada." The report estimates the value of water at 60 percent of all commodities produced in the foothills and mountains of the Sierra Nevada. This commodity-based view of water leads to some of the study's related conclusions that, "increased concern about the ecological impacts of diversions as well as the social decisions about who should bear the financial burdens of plans to reduce, or at least stop the growth of, these impacts requires a greater understanding of how diversions, economic benefits, and ecological impacts are linked."

Accomplishments

In 1997, Sacramento area interest released the Draft Recommendations for the water Forum Agreement. This stakeholder group is pursuing two objectives: (1) provide a reliable water supply for the region through 2030 and (2) reserve the fishery, wildlife recreation, and aesthetic values of the Lower American River. The proposed draft solution includes an integrated package of seven actions. Generally, foothill water interests would increase their diversions from the American River in average and wet years and decrease those diversions in drier and driest years. Placer County Water Agency would be providing excess water from non-American River sources to many of the participating water agencies during drier and

driest years to help make up the decreased American River diversions in those years. PCWA's participation in many of these specific agreements is dependent upon State Water Resources Control Board approval for changes to conditions of its existing water rights.

Relationship to Other Regions

Much of the State's developed water supply originates in this upland area, including several CVP and SWP reservoirs and the local facilities of Yuba county Water Agency, East Bay Municipal Utility District, the city of San Francisco, Modesto and Turlock Irrigation Districts, and Merced Irrigation District.

Looking to the Future

The Mountain Counties Area has limited water supply options compared with many of the other hydrologic regions because of its topography, geology, small population, ability to pay, and the fact that most water originating in the area is used in downstream areas. However, most water agencies are actively pursuing a wide variety of supply augmentation and demand reduction actions to secure water needed in the future. For example, El Dorado Irrigation District is investigating construction of the 31,000 acre-feet Alder Reservoir to provide drought storage, enhanced environmental flows, and hydropower generation benefits. In addition to its ongoing water conservation and water recycling programs, the District is planning on lining a 2.5-mile ditch system to save an estimated 1,300 acre-feet per year.

Regional Planning

The Mountain Counties Water Resources Association assists water agencies and local governments in coordinating water resource matters important to the region. The Association also interfaces with applicable state officials and departments on water resource matters.
Some agencies are looking for new supplies from expansion of existing storage, re-operation of existing hydroelectric storage, or construction of new storage. For example, Lyons Reservoir, located in the Tuolumne Utilities District (TUD), is a 5,800 acre-foot joint use facility, supplying both hydroelectric power and consumptive water storage. TUD is considering the expansion of Lyons Reservoir to 50,000 acre-feet. While large quantities of groundwater are not generally available in the Sierra-Cascade Mountain Area, a number of local agencies are implementing groundwater management strategies to help ensure the reliability of local groundwater supplies.

Several local agencies and governments are developing recycled water projects. A few examples are:

- El Dorado Irrigation District is investigating construction of up to 5,000 acre-feet of seasonal storage to more efficiently use recycled water in the District. The storage would allow for meeting recycled water demands, without supplemental water or shortages through 2025.
- The city of Auburn is developing a proposal to sell up to 5,000 acre-feet of recycled water to agricultural users by 2020. (The water is expected to be delivered near Lincoln, on the valley floor. This option is included in the Sacramento River Region management plan.)
- The city of Angels Camp, in Calaveras County, is developing plans to expand its reclaimed water deliveries by 300 acre-feet to agricultural, environmental, and landscape users by 2020.
- Two other projects in Calaveras County will deliver 470 acre-feet for landscape irrigation.
- Groveland Community Services District, in southern Tuolumne County anticipates 425 acre-feet being made available to agricultural customers by 2020.

- The Sierra Conservation Center, in Tuolumne County, is planning a project to deliver almost 300 acre-feet for agriculture and landscape irrigation by 2020.

Urban growth, an average of 1800 new home each year, in the city of Lincoln has created a need for new drinking water in an area that has been served agricultural water since 1926. An association comprised of the Nevada Irrigation District, Placer County Water Agency, and the city of Lincoln is investigating how to accommodate this change in water use to eliminate the need to find additional water supplies or continue groundwater pumping to meet the domestic water needs.

SSWD's Conveyance Canal Improvement Plan

- Increase the flexibility, timing, and reliability of surface water supplies.
- Replenish groundwater supplies for extraction in drier years.
- Recharge the groundwater basin to reduce the effect of declining groundwater levels.
- Provide the ability to meet additional water needs (including Bay Delta Authority environmental objectives) outside of SSWD.
- Replace older conveyance structures with advanced control technology.
- Enhance SSWD's conjunctive water management activities.
- Reduce the need for cropping changes during drier water years.
- Increase power generation and decrease power use for pumping.
- Increase water use efficiency by installing state-of-the-art water control and measurement structures.

In February 2000, South Sutter Water District, Camp Far West Irrigation District, and the California Department of Water Resources entered an agreement to meet the State Water Resource Control Boards water quality objectives (Phase 8 of the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary). In exchange for up to 4,400 acre-feet of water from Camp Far West Reservoir in each dry and critical year, DWR agreed to assume all responsibility for all Bear River water rights holders' obligations under Phase 8. In addition, South Sutter Water District is implementing its Conveyance Canal Improvement Plan to increase the system conveyance capacity. The additional water for conveyance will be obtained from increases in diversion of stored water and water that is spilled from Camp Far West Reservoir.

Water Portfolios for Water Years 1998, 2000, and 2001

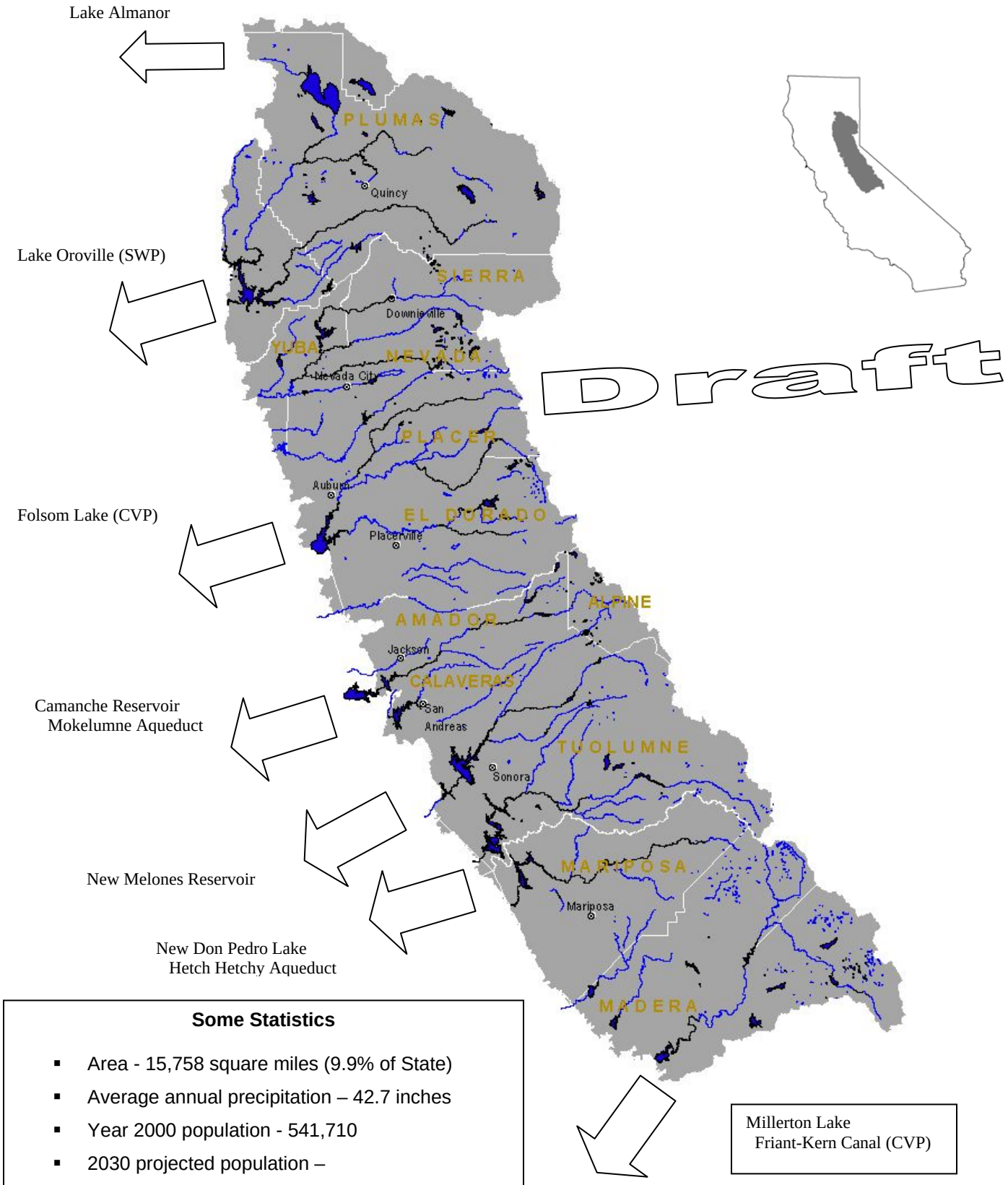
The following tables present actual information about the water supplies and uses for the Mountain Counties hydrologic region. Water year 1998 was a wet year for this region, with annual precipitation at 130 percent of normal, while the statewide annual precipitation was 170 percent of average. Year 2000 represents nearly normal hydrologic conditions with annual precipitation at 90 percent of average for the Mountain Counties region, and year 2001 reflected dryer water year conditions with annual precipitation at 55 percent of average. For comparison, statewide average precipitation in year 2001 was 75 percent of normal. Table 12-1 provides more detailed information about the total water supplies available to this region for these three specific years from precipitation, imports and groundwater, and also summarizes the uses of all of the water supplies. The three Water portfolio tables included in Table 12-2 and companion Water Portfolio flow diagrams (Figures 12-2, 12-3 and 12-4) provided more detailed information about how the available water supplies are distributed and used throughout this region.

A more detailed tabulation of the portion of the total available water that is dedicated to urban, agricultural and environmental purposes is presented in Table 3. Table 3 also provides detailed information about the sources of the developed water supplies, which are primarily from surface water systems and include a large percentage of water imports from other regions.

Sources of Information

- Water Quality Control Plan, Regional Water Quality Control Board
- Watershed Management Initiative Chapter, Regional Water Quality Control Board
- 2002 California 305(b) Report on Water Quality, State Water Resources Control Board
- Bulletin 118 (Draft), California's Groundwater, Update 2003, Department of Water Resources
- Nonpoint Source Program Strategy and Implementation Plan, 1998-2013, State Water Resources Control Board, California Coastal Commission, January 2000
- Strategic Plan, State Water Resources Control Board, Regional Water Quality Control Boards, November 15, 2001

Figure 13-1
Mountain Counties of California



Some Statistics

- Area - 15,758 square miles (9.9% of State)
- Average annual precipitation – 42.7 inches
- Year 2000 population - 541,710
- 2030 projected population –
- Total reservoir storage capacity - 18,185 TAF
- 2000 irrigated agriculture - 93,700 acres

Table 13-1
Mountain Counties of California Water Balance Summary – TAF

Water Entering the Region – Water Leaving the Region = Storage Changes in Region

	1998 (wet)	2000 (average)	2001 (dry)
Water Entering the Region			
Precipitation	55,206	38,412	23,445
Inflow from Oregon/Mexico	0	0	0
Inflow from Colorado River	0	0	0
Imports from Other Regions	0	0	0
Total	**55,206**	**38,412**	**23,445**
Water Leaving the Region			
Consumptive Use of Applied Water * (Ag, M&I, Wetlands)	236	303	263
Outflow to Oregon/Nevada/Mexico	0	0	0
Exports to Other Regions	4,374	3,744	2,606
Statutory Required Outflow to Salt Sink	3,404	2,331	1,636
Additional Outflow to Salt Sink	80	149	178
Evaporation, Evapotranspiration of Native Vegetation, Groundwater Subsurface Outflows, Natural and Incidental Runoff, Ag Effective Precipitation & Other Outflows	44,705	32,702	21,561
Total	**52,799**	**39,229**	**26,244**
Storage Changes in the Region [+] Water added to storage [–] Water removed from storage			
Change in Surface Reservoir Storage	2,420	-802	-2,721
Change in Groundwater Storage **	-13	-15	-78
Total	**2,407**	**-817**	**-2,799**

Applied Water * (compare with Consumptive Use)	397	464	447

* Definition - Consumptive use is the amount of applied water used and no longer available as a source of supply. Applied water is greater than consumptive use because it includes consumptive use, reuse, and outflows.

**Footnote for change in Groundwater Storage

Change in Groundwater Storage is based upon best available information. Basins in the north part of the State (North Coast, San Francisco, Sacramento River and North Lahontan Regions and parts of Central Coast and San Joaquin River Regions) have been modeled – spring 1997 to spring 1998 for the 1998 water year and spring 1999 to spring 2000 for the 2000 water year. All other regions and year 2001 were calculated using the following equation:

GW change in storage =
intentional recharge + deep percolation of applied water + conveyance deep percolation – withdrawals

This equation does not include the unknown factors such as natural recharge and subsurface inflow and outflow.

Table 13-2
Water Portfolios for Water Years 1998, 2000 and 2001

Category	Description	Mountain Counties 1998 (TAF)				Mountain Counties 2000 (TAF)				Mountain Counties 2001 (TAF)				Data
Inputs:		Water Portfolio	Applied Water	Net Water	Depletion	Water Portfolio	Applied Water	Net Water	Depletion	Water Portfolio	Applied Water	Net Water	Depletion	**Detail**
1	Colorado River Deliveries		-				-				-			PSA/DAU
2	Total Desalination		-				-				-			PSA/DAU
3	Water from Refineries		-				-				-			PSA/DAU
4a	Inflow From Oregon		-				-				-			PSA/DAU
b	Inflow From Mexico		-				-				-			PSA/DAU
5	Precipitation	55,205.7				38,412.2				23,444.5				REGION
6a	Runoff - Natural	N/A				N/A				N/A				REGION
b	Runoff - Incidental	N/A				N/A				N/A				REGION
7	Total Groundwater Natural Recharge	N/A				N/A				N/A				REGION
8	Groundwater Subsurface Inflow	N/A				N/A				N/A				REGION
9	Local Deliveries		1,954.0				1,516.4				1,062.9			PSA/DAU
10	Local Imports		9.7				10.9				8.5			PSA/DAU
11a	Central Valley Project :: Base Deliveries		5.5				6.1				7.0			PSA/DAU
b	Central Valley Project :: Project Deliveries		20.2				20.2				11.4			PSA/DAU
12	Other Federal Deliveries		1.6				1.6				1.6			PSA/DAU
13	State Water Project Deliveries		-				-				-			PSA/DAU
14a	Water Transfers - Regional		-				-				-			PSA/DAU
b	Water Transfers - Imported		-				-				-			PSA/DAU
15a	Releases for Delta Outflow - CVP		-				-				-			REGION
b	Releases for Delta Outflow - SWP		-				-				-			REGION
c	Instream Flow		1,569.5				1,563.0				1,450.6			REGION
16	Environmental Water Account Releases		-				-				-			PSA/DAU
17a	Conveyance Return Flows to Developed Supply - Urban		-				-				-			PSA/DAU
b	Conveyance Return Flows to Developed Supply - Ag		23.0				-				-			PSA/DAU
c	Conveyance Return Flows to Developed Supply - Managed Wetlands		-				-				-			PSA/DAU
18a	Conveyance Seepage - Urban		-				-				-			PSA/DAU
b	Conveyance Seepage - Ag		3.6				4.7				3.7			PSA/DAU
c	Conveyance Seepage - Managed Wetlands		-				-				-			PSA/DAU
19a	Recycled Water - Agriculture		1.2				1.2				1.2			PSA/DAU
b	Recycled Water - Urban		-				-				-			PSA/DAU
c	Recycled Water - Groundwater		-				-				-			PSA/DAU
20a	Return Flow to Developed Supply - Ag		56.0				-				-			PSA/DAU
b	Return Flow to Developed Supply - Wetlands		-				-				-			PSA/DAU
c	Return Flow to Developed Supply - Urban		-				-				-			PSA/DAU
21a	Deep Percolation of Applied Water - Ag		6.0				6.1				4.5			PSA/DAU
b	Deep Percolation of Applied Water - Wetlands		-				-				-			PSA/DAU
c	Deep Percolation of Applied Water - Urban		19.2				17.6				18.3			PSA/DAU
22a	Reuse of Return Flows within Region - Ag		7.7				12.0				6.9			PSA/DAU
b	Reuse of Return Flows within Region - Wetlands, Instream, W&S		4,917.6				3,330.3				1,783.0			PSA/DAU
24a	Return Flow for Delta Outflow - Ag		-				-				-			PSA/DAU
b	Return Flow for Delta Outflow - Wetlands, Instream, W&S		3,403.8				2,331.4				1,636.4			PSA/DAU
c	Return Flow for Delta Outflow - Urban Wastewater		-				-				-			PSA/DAU
25	Direct Diversions	N/A				N/A				N/A				PSA/DAU
26	Surface Water in Storage - Beg of Yr	11,595.4				12,504.6				11,702.6				PSA/DAU
27	Groundwater Extractions - Banked	-				-				-				PSA/DAU
28	Groundwater Extractions - Adjudicated	-				-				-				PSA/DAU
29	Groundwater Extractions - Unadjudicated	60.5				61.2				73.9				REGION
Withdrawals:	**In Thousand Acre-feet**													
23	Groundwater Subsurface Outflow	-				-				-				REGION
30	Surface Water Storage - End of Yr	14,015.1				11,702.6				8,982.1				PSA/DAU
31	Groundwater Recharge-Contract Banking		-				-				-			PSA/DAU
32	Groundwater Recharge-Adjudicated Basins		-				-				-			PSA/DAU
33	Groundwater Recharge-Unadjudicated Basins		-				-				-			REGION
34a	Evaporation and Evapotranspiration from Native Vegetation				N/A				N/A				N/A	REGION
b	Evaporation and Evapotranspiration from Unirrigated Ag				N/A				N/A				N/A	REGION
35a	Evaporation from Lakes				92.4				107.2				98.5	REGION
b	Evaporation from Reservoirs				630.2				711.0				646.4	REGION
36	Ag Effective Precipitation on Irrigated Lands		75.2				51.9				70.8			REGION
37	Agricultural Use		261.3	247.6	191.5		329.7	311.6	311.6		305.9	294.5	294.6	PSA/DAU
38	Wetlands Use		-	-	-		-	-	-		-	-	-	PSA/DAU
39a	Urban Residential Use - Single Family - Interior		29.4				28.9				30.0			PSA/DAU
b	Urban Residential Use - Single Family - Exterior		60.4				60.1				62.6			PSA/DAU
c	Urban Residential Use - Multi-family - Interior		10.2				10.1				10.5			PSA/DAU
d	Urban Residential Use - Multi-family - Exterior		3.3				3.6				3.8			PSA/DAU
40	Urban Commercial Use		10.8				10.5				11.2			PSA/DAU
41	Urban Industrial Use		10.3				10.3				10.4			PSA/DAU
42	Urban Large Landscape		11.3				11.0				11.6			PSA/DAU
43	Urban Energy Production		-				-				-			PSA/DAU
44	Instream Flow		1,569.5	1,269.9	1,269.9		1,563.0	1,305.8	1,305.8		1,450.6	1,323.1	1,323.1	PSA/DAU
45	Required Delta Outflow		-	-	-		-	-	-		-	-	-	PSA/DAU
46	Wild & Scenic Rivers Use		6,751.9	2,133.9	2,133.9		4,098.7	1,025.6	1,025.6		1,968.8	313.3	313.3	PSA/DAU
47a	Evapotranspiration of Applied Water - Ag				176.9				248.6				205.9	PSA/DAU
b	Evapotranspiration of Applied Water - Managed Wetlands				-				-				-	PSA/DAU
c	Evapotranspiration of Applied Water - Urban				59.3				54.5				56.7	PSA/DAU
48	Evaporation and Evapotranspiration from Urban Wastewater				-				-				-	REGION
49	Return Flows Evaporation and Evapotranspiration - Ag				6.0				7.8				6.0	PSA/DAU
50	Urban Waste Water Produced	43.4				50.7				52.7				REGION
51a	Conveyance Evaporation and Evapotranspiration - Urban				10.0				9.6				9.6	PSA/DAU
b	Conveyance Evaporation and Evapotranspiration - Ag				10.7				23.9				22.7	PSA/DAU
c	Conveyance Evaporation and Evapotranspiration - Managed Wetlands				-				-				-	PSA/DAU
d	Conveyance Loss to Mexico				-				-				-	PSA/DAU
52a	Return Flows to Salt Sink - Ag				12.4				77.6				104.2	PSA/DAU
b	Return Flows to Salt Sink - Urban				67.2				71.6				74.2	PSA/DAU
c	Return Flows to Salt Sink - Wetlands				-				-				-	PSA/DAU
53	Remaining Natural Runoff - Flows to Salt Sink				0.0				0.0				0.0	REGION
54a	Outflow to Nevada				-				-				-	REGION
b	Outflow to Oregon				-				-				-	REGION
c	Outflow to Mexico				-				-				-	REGION
55	Regional Imports	0.0				0.0				0.0				REGION
56	Regional Exports	4,373.6				3,744.1				2,605.6				REGION
59	Groundwater Net Change in Storage	-12.5				-15.1				-78.2				REGION
60	Surface Water Net Change in Storage	2,419.7				-802.0				-2,720.5				REGION
61	Surface Water Total Available Storage	18,185.0				18,185.0				18,185.0				REGION

Colored spaces are where data belongs. N/A - Data Not Available "-" - Data Not Applicable "0" - Null value

Table 13-3
Mountain Counties of California Water Use and Distribution of Dedicated Supplied

	1998			2000			2001		
	Applied Water Use	Net Water Use	Depletion	Applied Water Use	Net Water Use	Depletion	Applied Water Use	Net Water Use	Depletion
WATER USE									
Urban									
Large Landscape	11.3			11.0			11.6		
Commercial	10.8			10.5			11.2		
Industrial	10.3			10.3			10.4		
Energy Production	0.0			0.0			0.0		
Residential - Interior	39.6			39.0			40.5		
Residential - Exterior	63.7			63.7			66.4		
Evapotranspiration of Applied Water		59.3	59.3		54.5	54.5		56.7	56.7
Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Outflow		57.3	57.3		62.4	62.4		65.0	65.0
Conveyance Losses - Applied Water	19.9			18.8			18.8		
Conveyance Losses - Evaporation		10.0	10.0		9.6	9.6		9.6	9.6
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		9.9	9.9		9.2	9.2		9.2	9.2
GW Recharge Applied Water	0.0			0.0			0.0		
GW Recharge Evap + Evapotranspiration		0.0	0.0		0.0	0.0		0.0	0.0
Total Urban Use	**155.6**	**136.5**	**136.5**	**153.3**	**135.7**	**135.7**	**158.9**	**140.5**	**140.5**
Agriculture									
On-Farm Applied Water	261.3			329.7			305.9		
Evapotranspiration of Applied Water		176.9	176.9		248.6	248.6		205.9	205.9
Irrecoverable Losses		6.0	6.0		7.8	7.8		6.0	6.0
Outflow		64.6	8.6		55.2	55.2		82.7	82.7
Conveyance Losses - Applied Water	49.7			61.8			58.1		
Conveyance Losses - Evaporation		10.7	10.7		23.9	23.9		22.7	22.7
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		26.8	3.8		22.4	22.4		21.5	21.5
GW Recharge Applied Water	0.0			0.0			0.0		
GW Recharge Evap + Evapotranspiration		0.0	0.0		0.0	0.0		0.0	0.0
Total Agricultural Use	**310.9**	**285.0**	**206.0**	**391.5**	**357.9**	**357.9**	**364.0**	**338.8**	**338.8**
Environmental									
Instream									
Applied Water	1,569.5			1,563.0			1,450.6		
Outflow		1,269.9	1,269.9		1,305.8	1,305.8		1,323.1	1,323.1
Wild & Scenic									
Applied Water	6,751.9			4,098.7			1,968.8		
Outflow		2,133.9	2,133.9		1,025.6	1,025.6		313.3	313.3
Required Delta Outflow									
Applied Water	0.0			0.0			0.0		
Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Managed Wetlands									
Habitat Applied Water	0.0			0.0			0.0		
Evapotranspiration of Applied Water		0.0	0.0		0.0	0.0		0.0	0.0
Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Applied Water	0.0			0.0			0.0		
Conveyance Losses - Evaporation		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Total Managed Wetlands Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Environmental Use	**8,321.4**	**3,403.8**	**3,403.8**	**5,661.7**	**2,331.4**	**2,331.4**	**3,419.4**	**1,636.4**	**1,636.4**
TOTAL USE AND LOSSES	**8,788.0**	**3,825.3**	**3,746.3**	**6,206.5**	**2,825.0**	**2,825.0**	**3,942.3**	**2,115.7**	**2,115.7**
DEDICATED WATER SUPPLIES									
Surface Water									
Local Deliveries	1,954.0	1,954.0	1,876.5	1,516.4	1,516.4	1,516.4	1,062.9	1,062.9	1,062.9
Local Imported Deliveries	9.7	9.7	9.3	10.9	10.9	10.9	8.5	8.5	8.5
Colorado River Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Base and Project Deliveries	25.7	25.7	24.7	26.3	26.3	26.3	18.4	18.4	18.4
Other Federal Deliveries	1.6	1.6	1.5	1.6	1.6	1.6	1.6	1.6	1.6
SWP Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Required Environmental Instream Flow	1,806.4	1,806.4	1,806.4	1,241.9	1,241.9	1,241.9	982.2	982.2	982.2
Groundwater									
Net Withdrawal	26.7	26.7	26.7	26.7	26.7	26.7	40.9	40.9	40.9
Artificial Recharge	0.0			0.0			0.0		
Deep Percolation	33.8			34.5			33.0		
Reuse/Recycle									
Reuse Surface Water	4,928.9			3,347.0			1,793.6		
Recycled Water	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
TOTAL SUPPLIES	**8,788.0**	**3,825.3**	**3,746.3**	**6,206.5**	**2,825.0**	**2,825.0**	**3,942.3**	**2,115.7**	**2,115.7**
Balance = Use - Supplies	*-0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Figure 13-2
Mountain Counties of California 1998 Flow Diagram
In Thousand Acre-Feet (TAF)

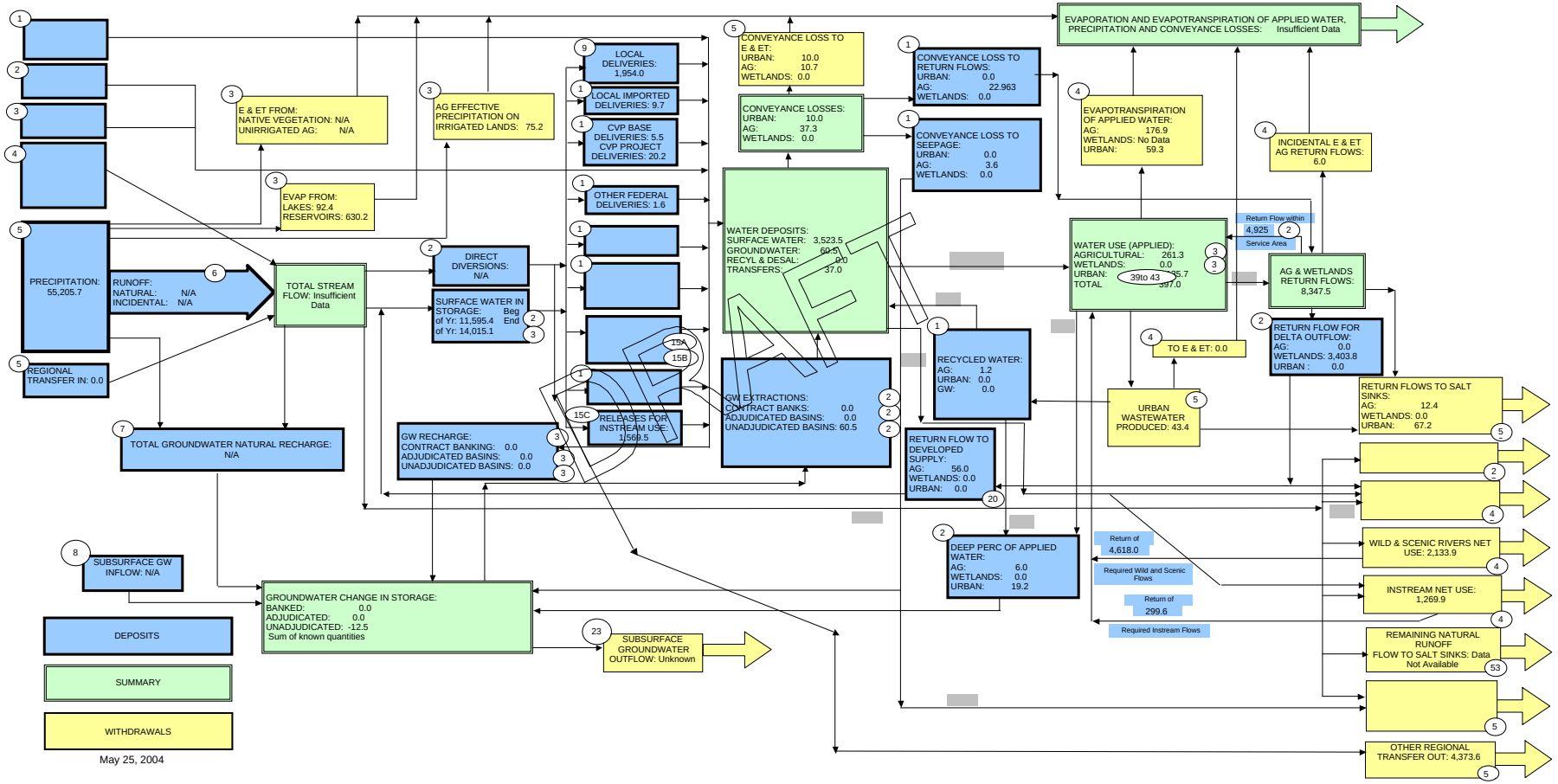


Figure 13-3
Mountain Counties of California 2000 Flow Diagram
In Thousand Acre-Feet (TAF)

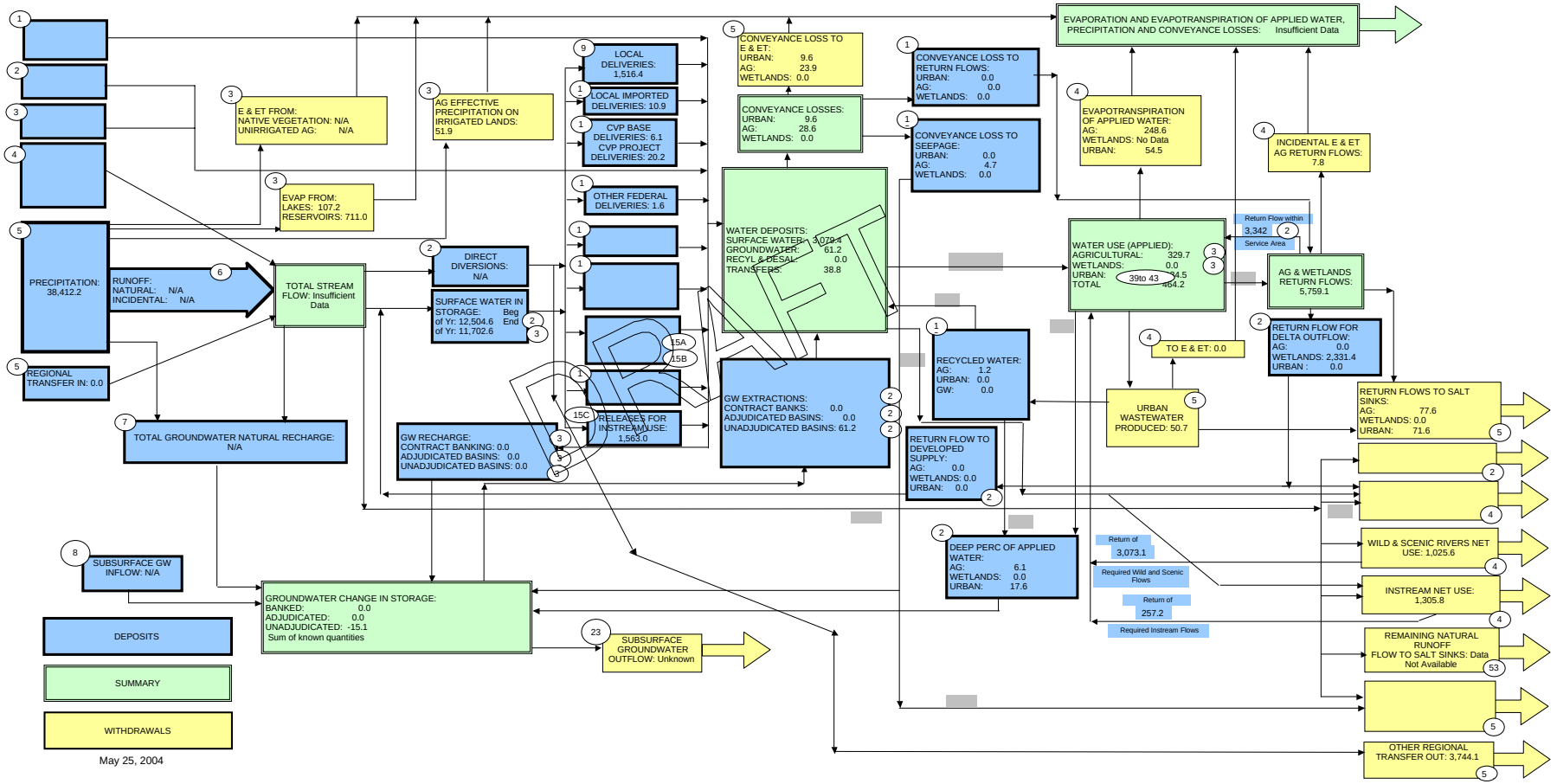


Figure 13-4
Mountain Counties of California 2001 Flow Diagram
In Thousand Acre-Feet (TAF)